

## ABSTRACT

A method and apparatus for processing multiple signals at a common frequency combined into a single radio frequency cable and subsequently recovering the signals without significant losses, distortion, or cross-talk. The method and apparatus includes processing multiple signals at a common frequency fed through a single radio frequency (RF) cable with or without one or more amplifiers and utilized for either forward or reverse link transmissions. The invention enables a single power amplifier to amplify multiple RF signals that occupy a common frequency channel and after amplification splitting these signals into amplified copies of the originals. The amplified signals may be sent to different antenna ports to illuminate different base station sectors if required. The signal splitting function is performed at the antenna masthead such that this method reduces the number of feeder cables running up the antenna tower by a factor of  $N$ , where  $N$  is the number of common frequency signals (e.g., the number of sectors) amplified by the single power amplifier. This invention enables a single power amplifier to simultaneously provide all the radio frequency signals necessary to feed a general  $N$  input phased array antenna system and form multiple antenna beams uniquely for several individual users simultaneously.